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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

PTOL-90A (Rev. 04/07)

Office Action Summary	Application No.	Applicant(s)	
	10/767,597	RATAKONDA ET AL.	
	Examiner	**Art Unit**	
	Chikaodili E. Anyikire	2621	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *29 January 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-33* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-7,14-22 and 29-33* is/are rejected.

7)☒ Claim(s) *11-13 and 26-28* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *29 January 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *20060706*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. This application is responsive to application number (10/767597) filed on January 29, 2004. Claims 1 – 33 are pending and have been examined.

Information Disclosure Statement

2. Acknowledgement is made of applicant's information disclosure statement.

Specification

3. The disclosure is objected to because of the following informalities: the symbols used for Boolean operations are not standard symbols.

Appropriate correction is required.

Claim Objections

4. Claims 8-13 and 23-28 are objected to because of the following informalities: the symbols used for Boolean operations are not standard symbols. Appropriate correction is required.

5. Claims 28 and 29 objected to because of the following informalities: The applicant numbers claims 28 twice, but does not provide a claim 29. Appropriate correction is required.

Claim Rejections - 35 USC § 101

6. 35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

7. Claims 31-33 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter. An acceptable form of claims 31-33 preamble reads, "A computer readable medium encoded with computer executable instructions for predictively encoding digital video sequences, said set of computer executable instructions comprising:". See "101 Interim Guidelines for Examination of Patent Applications for Patent Subject matter Eligibility", Annex IV, Computer-Related Non-Statutory Subject Matter.

Claim Rejections - 35 USC § 102

8. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

9. Claims 1, 16, and 31 are rejected under 35 U.S.C. 102(e) as being anticipated by Kondo et al (US 6,625,322) (provided by applicant in the IDS filed on July 06, 2005).

As per claim 1, Kondo et al discloses a method for predictively encoding digital video sequences, comprising:

dynamically determining the resolution of a current frame being encoded and outputting the determination (Fig 21, 630), the selection being based on statistical (Fig

21, 625; Col 11 Ln 49 – Col 12 Ln 20) and coding information of a plurality of frames (Fig 21, 624; Col 11 Ln 49- Col 12 Ln 20), including at least one previous frame and the current frame; selecting encoding parameters (Fig 21, 623) and encoding (Fig 21, 610) a current frame at a chosen resolution (Col 11 Ln 53-59),

wherein the encoding parameter selection step takes into account the determination of the dynamic resolution selection step in determining the encoding parameters (Fig 21, 610; (650, 651; Details shown in Fig 26); Col 12 Ln 21-57).

Regarding claim 16, arguments analogous to those presented for claim 1 are applicable to claim 16.

Regarding claim 31, arguments analogous to those presented for claim 1 are applicable to claim 31.

Claim Rejections - 35 USC § 103

10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

11. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.

4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

12. Claims 2-7, 15, 17-22, 30, 32 and 33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kondo et al (US 6,625,322) in view of Nakagawa et al (US 6,025,880).

As per claim 2, Kondo et al discloses the method of claim 1,

wherein the statistical information includes scene-change information (Fig 21, 625; Col 12 Ln 5-20), and

the coding information includes a measure of the quantization used by the frames (Col 11 Ln 58-59) and a measure of the availability of bits (Fig 21, 623; Col 12 Ln 3-5).

However, Kondo et al does not explicitly teach the statistical information include estimated motion information.

In the same field of endeavor, Nakagawa et al disclose in Fig 2, the motion prediction/calculation means 22 calculates given information (information of a motion vector or information of a prediction error) concerning a motion vector on the basis of predictive pictures provided by the resolution conversion means 21 and 24. The resolution determination means 23 uses a given scale (scale indicating a prediction error or scale indicating randomness) to judge from the given information whether or not an amount of information produced for encoding a picture to be transmitted to a transmission line is large, and determines a resolution for the picture on the basis of the judgment.

The motion prediction/calculation means 22 in Fig 2 generally uses block matching as motion compensation. The block matching is such that a predictive picture is slid to search for an area matched with a block of an input original picture. In a picture encoding system using motion compensation, motion prediction based on each block is a kind of picture analysis means. Information resulting from motion prediction expresses the features of a picture quantitatively faithfully and is therefore useful in the judgment of a resolution in accordance with the present invention. According to the present invention, information of a motion vector calculated as information provided by the motion prediction/calculation means 22 during motion prediction and information of a prediction error calculated during motion prediction are employed (S201 and S202) as shown in Fig 3.

Therefore, it would have been obvious to one having ordinary skill in the art at the time of invention was made to modify the coding system of Kondo et al with the motion prediction of Nakagawa et al. The motion prediction of Nakagawa et al advantage is providing motion information of previous and succeeding frames. This information will be used as a scale for determining a resolution that will result in selection of optimum resolution (Nakagawa, Col 8 Ln 39-51).

As per claim 3, Kondo et al discloses the method of claim 2,

further including the step of measuring the availability of bits by determining the decoder buffer fullness (Col 11 Ln 58-59; the prior art discloses a bit allocator to define the quantization scale and therefore controls the buffer bits).

As per claim 4, The method of claim 2, wherein the dynamic resolution is further based on functional conditions based on the statistical (Fig 21, 632) and coding information (Fig 21, 623), on the basis of which the resolution selection is performed are different for a low-to-high resolution switch as compared to a high-to-low resolution switch (Fig 21, 630; Col 12 Ln 21-57).

As per claim 5, Kondo et al discloses the method of claim 3, further including the step of taking the output of the dynamic resolution selection step (Fig 21, 630) by coding the current frame non-predictively if the dynamic resolution selection step determines that the current frame be coded at a different resolution than the immediately preceding frame (Col 12 Ln 55 – Col 13 Ln 57; prior art's teachings are mainly concentrated on non-predictive encoding).

As per claim 6, Kondo et al discloses the method of claim 3, further including the step of taking the output of the dynamic resolution selection step (Fig 21, 630) by coding the current frame.

However, Kondo et al does not explicitly teach in a combined predictive and non-predictive fashion, with non-predictive coding favored, the decision between predictive and non-predictive coding taken on the basis of frame statistics for a plurality of previous frames and the current frame, if the dynamic resolution selection step determines that the current frame be coded at a different resolution than the immediately preceding frame.

In the same field of endeavor, Nakagawa et al disclose in Fig 2, the motion prediction/calculation means 22 calculates given information (information of a motion

vector or information of a prediction error) concerning a motion vector on the basis of predictive pictures provided by the resolution conversion means 21 and 24. The resolution determination means 23 uses a given scale (scale indicating a prediction error or scale indicating randomness) to judge from the given information whether or not an amount of information produced for encoding a picture to be transmitted to a transmission line is large, and determines a resolution for the picture on the basis of the judgment.

The motion prediction/calculation means 22 in Fig 2 generally uses block matching as motion compensation. The block matching is such that a predictive picture is slid to search for an area matched with a block of an input original picture. In a picture encoding system using motion compensation, motion prediction based on each block is a kind of picture analysis means. Information resulting from motion prediction expresses the features of a picture quantitatively faithfully and is therefore useful in the judgment of a resolution in accordance with the present invention. According to the present invention, information of a motion vector calculated as information provided by the motion prediction/calculation means 22 during motion prediction and information of a prediction error calculated during motion prediction are employed (S201 and S202) as shown in Fig 3.

Therefore, it would have been obvious to one having ordinary skill in the art at the time of invention was made to modify the coding system of Kondo et al with the motion prediction of Nakagawa et al. The motion prediction of Nakagawa et al advantage is providing motion information of previous and succeeding frames. This

information will be used as a scale for determining a resolution that will result in selection of optimum resolution (Nakagawa, Col 8 Ln 39-51).

As per claim 7, Kondo et al discloses the encoding method of claim 6.

However, Kondo et al does not explicitly teach wherein the statistics include an estimate of the motion, the estimate being based on motion information including the energy of the motion-compensated residual of the current frame.

In the same field of endeavor, Nakagawa et al disclose in Fig 2, the motion prediction/calculation means 22 calculates given information (information of a motion vector or information of a prediction error) concerning a motion vector on the basis of predictive pictures provided by the resolution conversion means 21 and 24. The resolution determination means 23 uses a given scale (scale indicating a prediction error or scale indicating randomness) to judge from the given information whether or not an amount of information produced for encoding a picture to be transmitted to a transmission line is large, and determines a resolution for the picture on the basis of the judgment.

Therefore, it would have been obvious to one having ordinary skill in the art at the time of invention was made to modify the coding system of Kondo et al with the motion prediction of Nakagawa et al. The motion prediction of Nakagawa et al advantage is providing motion information of previous and succeeding frames. This information will be used as a scale for determining a resolution that will result in selection of optimum resolution (Nakagawa, Col 8 Ln 39-51).

Regarding claim 15, arguments analogous to those presented for claims 1 and 2 are applicable to claim 15.

Regarding claim 17, arguments analogous to those presented for claim 2 are applicable to claim 17.

Regarding claim 18, arguments analogous to those presented for claim 3 are applicable to claim 18.

Regarding claim 19, arguments analogous to those presented for claim 4 are applicable to claim 19.

Regarding claim 20, arguments analogous to those presented for claim 5 are applicable to claim 20.

Regarding claim 21, arguments analogous to those presented for claim 6 are applicable to claim 21.

Regarding claim 22, arguments analogous to those presented for claim 7 are applicable to claim 22.

Regarding claim 30, arguments analogous to those presented for claim 15 are applicable to claim 30.

Regarding claim 32, arguments analogous to those presented for claim 2 are applicable to claim 32.

As per claim 33, Kondo et al discloses the computer program product of claim 31, wherein the means for dynamically selecting the resolution of the current frame being encoded further includes the step of the statistical and coding information being

generated by a previous execution of the means for selecting encoding parameters and encoding the current frame at a chosen resolution (Col 12 Ln 55 – Col 13 Ln 57).

13. Claims 8-10, 14, 23-25, and 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kondo et al (US 6,625,322) in view of Nakagawa et al (US 6,025,880), and further in view of Naveen et al (US 5, 995, 151).

As per claim 8, the modified device of Kondo et al discloses the method of claim 4, further including the step of determining a high-to-low resolution switch being affected (Fig 21, 630; Col 12 Ln 21-57).

However, the modified device of Kondo et al does not explicitly teach the switch being affected is given by the following condition, the switch being affected if the condition C_1 evaluates to TRUE

$$C_1=\{\{Q > T_Q\} \text{ AND } \{M>T_M\}\} \text{ OR } \{B_{dec} < T_B\}$$

where Q is a measure of the quantization scales used to encode a plurality of previous frames, M is a measure of the motion present in a plurality of previous frames and the current frame, B_{dec} is a measure of the decoder buffer fullness and T_Q, T_M and T_B are preset thresholds.

Consider the alternate from of the limitation recited in the condition C_1, the prior art should only disclose $\{B_{dec} < T_B\}$ to be true to meet claim limitation.

In the same field of endeavor, Naveen et al teaches the average bits R generated by a block, frame or field of samples. In MPEG one of the requirements for generating a correctly coded bitstream is that the Video Buffer Verifier (VBV) is not violated. The VBV is a hypothetical decoder, described in ISO/IEC 13818-2 Annex C, which is conceptually connected to the output of an MPEG encoder. The VBV has an input buffer known as the VBV buffer of size B_{max} bits. The target rate R(n) computed in step 2(d) above in the overlapping window method, or in step 3(d) in the non-overlapping window method, may have to be adjusted so as not to overflow or underflow the VBV buffer. The occupancy of the VBV buffer for a constant bit-rate operation of MPEG is shown in Fig 7 in idealized form. The prior art teach a buffer that has a threshold, B_{max}, which is equivalent to T_B (Col 5 Ln 64 – Col 6 Ln 7).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the modified device of Kondo et al with the teachings of Naveen et al to evaluate the condition of the resolution switch to be true. The advantage of Naveen et al is that it prevents decoder buffer underflow and overflow.

As per claim 9, the modified of device of Kondo et al disclose the method of claim 8.

However, the modified device of Kondo et al does not explicitly teaches wherein the quantization measure is based on a rolling average of the quantization scales of a plurality of previous frames and the predicted quantization scale of the current frame.

In the same field of endeavor, Naveen et al teaches the average bits R generated by a block, frame or field of samples. In MPEG one of the requirements for generating a correctly coded bitstream is that the Video Buffer Verifier (VBV) is not violated. The VBV is a hypothetical decoder, described in ISO/IEC 13818-2 Annex C, which is conceptually connected to the output of an MPEG encoder. The VBV has an input buffer known as the VBV buffer of size B_{max} bits. The target rate R(n) computed in step 2(d) above in the overlapping window method, or in step 3(d) in the non-overlapping window method, may have to be adjusted so as not to overflow or underflow the VBV buffer. The occupancy of the VBV buffer for a constant bit-rate operation of MPEG is shown in Fig 7 in idealized form. The average coding rate in bits per picture, R, relates to the calculation of the quantization scale by the bit allocator (Col 5 Ln 64 – Col 6 Ln 7).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the modified device of Kondo et al with the R, average coding rate in bits per picture, which relates to the quantization scale of Naveen et al. The advantage of Naveen et al is that the average coding rate, R, aids in calculating a quality factor.

As per claim 10, The method of claim 8, , further the motion estimate is based on the rolling average of the motion measure of an individual frame, the measure being based on the energy of the motion-compensated residual of the frame and the motion vector magnitudes for the frame (Col 3 Ln 57-67).

However, the modified device of Kondo does not explicitly teach wherein the quantization measure is based on a rolling average of the quantization scales of a plurality of previous frames.

In the same field of endeavor, Naveen et al teaches the average bits R generated by a block, frame or field of samples. In MPEG one of the requirements for generating a correctly coded bitstream is that the Video Buffer Verifier (VBV) is not violated. The VBV is a hypothetical decoder, described in ISO/IEC 13818-2 Annex C, which is conceptually connected to the output of an MPEG encoder. The VBV has an input buffer known as the VBV buffer of size B_{max} bits. The target rate R(n) computed in step 2(d) above in the overlapping window method, or in step 3(d) in the non-overlapping window method, may have to be adjusted so as not to overflow or underflow the VBV buffer. The occupancy of the VBV buffer for a constant bit-rate operation of MPEG is shown in Fig 7 in idealized form (Col 5 Ln 64 – Col 6 Ln 7).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the modified device of Kondo et al with the teachings of Naveen et al to base the motion estimation on the rolling average of an individual frame. The advantage of Naveen et al is that it aids in calculation of the motion of the current frame.

As per claim 14, the modified device of Kondo et al discloses the method of claim 2, wherein the scene-change detection is based on the pixel difference and frame mean of two successive frames.

However, the modified device of Kondo et al does not explicitly teach the wherein the scene-change detection is based on the inter-pixel difference and frame mean of two successive frames.

In the same field of endeavor, Naveen et al teaches in a more general compression of video using MPEG the coded pictures may be categorized into three types: I, B, and P. An intra-coded (I) picture is coded using information only from itself/ A predictive-coded (P) picture is coded using motion compensated prediction from a past reference frame or past reference field. A Bidirectionally-coded (B) picture is coded using motion compensated prediction from a past and/or future references frame(s).

Therefore, it would have been obvious to one of ordinary skill in the art to modify the scene detection of the modified device of Kondo et al with the inter-prediction of Naveen et al. The advantage of using the B-pictures of Naveen et al is to reduce the amount of coding need by using two future frames.

Regarding claim 23, arguments analogous to those presented for claim 8 are applicable to claim 23.

Regarding claim 24, arguments analogous to those presented for claim 9 are applicable to claim 24.

Regarding claim 25, arguments analogous to those presented for claim 10 are applicable to claim 25.

Regarding claim 29, arguments analogous to those presented for claim 14 are applicable to claim 29.

Allowable Subject Matter

14. Claims 11-13 and 26-28 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Chikaodili E. Anyikire whose telephone number is (571) 270-1445. The examiner can normally be reached on Monday to Friday, 7:30 am to 5 pm, EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mehrdad Dastouri can be reached on (571) 272 - 7418. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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